



Fifteen Thousand Hours

*Secondary Schools
and Their Effects on Children*

Michael Rutter
Barbara Maughan
Peter Mortimore
Janet Ouston

Fifteen Thousand Hours

Secondary schools and their effects on children

Michael Rutter

Barbara Maughan

Peter Mortimore

Janet Ouston

with Alan Smith

HARVARD UNIVERSITY PRESS
CAMBRIDGE, MASSACHUSETTS

Copyright © 1979
by Michael Rutter, Barbara Maughan,
Peter Mortimore, Janet Ouston

All rights reserved
Printed in the United States of America
10 9 8 7 6 5

Library of Congress Cataloging in Publication Data

Main entry under title:
Fifteen thousand hours.

Bibliography: p.
Includes index.

1. High schools—England—London. 2. High
school students—England—London—Attitudes.

I. Rutter, Michael.

LA635.F5 373.421'2 78-23382

ISBN 0-674-30025-4 (cloth)

ISBN 0-674-30026-2 (paper)

FIFTEEN THOUSAND HOURS

Preface and Acknowledgements

The research reported in this book would have been impossible without the generous help we have received at every stage from the Head Teachers and staff of the schools involved. A large number of both primary and secondary schools contributed to the earlier stages of the work, from 1970 onwards, and our thanks are due both to the teaching and the secretarial staff who helped in providing all the information from which the present study grew. More recently, our debt has been to the twelve secondary schools which have formed the focus of this part of the study. Throughout three years of field work the Heads and staff allowed us unlimited access to all aspects of school life, and gave most generously of their own time. Each stage of the research has been planned in conjunction with a working party of teachers from local schools, who have given us invaluable guidance and encouragement. The project is as much theirs as ours, and the ideas and suggestions of the teachers taking part in the research have done much to shape both the study itself and this report. Because of the demands of confidentiality none of these teachers can be named or adequately thanked here, but we hope that they will feel that all the time, energy and thought they have given to the research has been worthwhile.

Many research workers have been involved with the project during the last eight years. We are particularly indebted to Bridget Yule who first developed co-operative working relationships with the schools, and who was primarily responsible for the follow through of the children from 1970 to 1974 in the first stage of the project. Michael Rutter has directed the work from the outset; Barbara Maughan, Peter Mortimore and Janet Ouston developed the measures of the schools and were responsible for the field work and data analysis from 1975 onwards; Alan Smith has given invaluable advice and guidance on data preparation and statistical procedures and provided the brief outline of log-linear modelling in Appendix H. The research has drawn on ideas from many different branches of the social sciences, as reflected

in the different professional backgrounds of those involved. Barbara Maughan's background was in social work and social administration, Peter Mortimore is an experienced teacher and educational psychologist, Janet Ouston a developmental psychologist, Michael Rutter a child psychiatrist, and Alan Smith a statistician.

The findings are based on complex and extensive data which have required detailed statistical analyses. Some of these have been included in the text, but those thought most likely to be of interest just to research workers have been placed in appendices at the end of the book. As many readers may not be familiar with all the statistical techniques used, we have included brief descriptions of the methods of analysis at various points through the book. These do not give mathematical details but merely provide an outline of the methods used, which we hope will make both the rationale of the study and the findings accessible to teachers, parents and others interested in secondary education.

The research has been generously supported throughout by the Inner London Education Authority. The Research and Statistics Division, the Divisional Officers, and many individual members of staff in local offices have provided constant encouragement for the work and have allowed us access to statistical data. The I.L.E.A. provided funding for the earlier stages of the work, and from 1975 onwards the project has been financially supported by the Department of Education and Science. Our thanks are also due to the Metropolitan Police, for enabling us to use data from their Juvenile Bureaux. The 'Statistical Package for the Social Sciences' (Nie et al., 1975) was used for all data analyses apart from the log-linear modelling.

Finally, we would like to thank Kathy Brook, Pauline Ellerman, Joy Maxwell and Libby Ryan who typed the several drafts of the manuscript with great speed, accuracy and patience. Joy Maxwell also prepared the list of references and Pauline Ellerman, as project secretary, has helped us in innumerable ways over the last four years.

FIFTEEN THOUSAND HOURS

Contents

Preface and Acknowledgements	vii
1 Introduction: previous studies	1
2 Background to the study	22
3 The schools and the area they serve	30
4 Research strategy and tactics	43
5 School outcomes: children's attendance, behaviour and attainments	66
6 Physical and administrative features of schools: associations with outcome	95
7 School processes: associations with outcome	106
8 Ecological influences	145
9 Composite analyses of all main variables	163
10 Conclusions: speculations and implications	177
<i>Appendices</i>	
A Pupil behaviour scale	206
B School goals	212
C Ten naughty children: examples	213
D Format of pupil questionnaire	214
E Details of process items	217
F Observations	230
G Additional tables	238
H Analysis of multiway contingency tables by log linear models	246
I Attainment at the end of the first year in the sixth form	257
J Intake and administrative variables	262
K Comparison between 12 "research" schools and 8 other schools which took part in 14 year old survey	265
References	267
Name index	275
Subject index	279

Introduction: previous studies

For almost a dozen years during a formative period of their development children spend almost as much of their waking life at school as at home. Altogether this works out at some *15,000 hours* (from the age of five until school leaving) during which schools and teachers may have an impact on the development of the children in their care. Do a child's experiences at school have any effect; does it matter *which* school he goes to; and which are the features of school that matter? These are the issues which gave rise to the study of twelve London secondary schools described in this book. The research findings provide a clear 'yes' in response to the first two questions. Schools do indeed have an important impact on children's development and it does matter which school a child attends. Moreover, the results provide strong indications of what are the particular features of school organisation and functioning which make for success.

Our finding that schooling *does* make a difference will come as no surprise to parents who often go to a good deal of trouble to get their children into schools of their choice. On the other hand, at the time the study was started there was a widespread acceptance among academics that schools made little difference. This view largely stemmed from two very influential books from the United States: James Coleman's (1966) report on *Equality of Educational Opportunity* and Christopher Jencks' (1972) *Inequality: A Reassessment of the Effect of Family and Schooling in America*. Coleman conducted a large scale survey of the achievement of some 645,000 students in 4000 elementary and secondary schools. The results were held to indicate that educational attainment was largely independent of the schooling a child received. Jencks reassessed a mass of statistical evidence from a variety of investigations, including the 'Coleman Report'. His analyses led to the rather startling conclusions that: 'equalizing the quality of high schools would reduce cognitive inequality by one per cent or less' and that 'additional school expenditures are

unlikely to increase achievement, and redistributing resources will not reduce test score inequality'. At about the same time Arthur Jensen (1969) reviewed the evidence on the factors which influence IQ and scholastic attainment and drew his controversial conclusion that: 'Compensatory education has been tried and it apparently has failed'.

At the same time British writers were drawing rather similar conclusions about the limited influence of schools on the development of their pupils. The Plowden Report (1967), which drew on evidence comparable in many respects to that in the Coleman study, concluded that home influences far outweighed those of the school. David Farrington (1972) wrote an article entitled 'Delinquency begins at home', which claimed to show that Michael Power's (1967) earlier demonstration that schools varied greatly in delinquency rates was largely a reflection of the fact that schools varied greatly in the proportions of their children who had already shown troublesome behaviour at primary school.

There was a widespread pessimism about the extent that schools could have any impact on children's development and Basil Bernstein's (1970) view that 'Education cannot compensate for society' was generally accepted. However, it is important to recognise that there was immense *disagreement* on just what *did* have an influence on children's behaviour and attainments. Jensen (1969) saw hereditary factors as predominant; Jencks (1972), on the other hand, mainly put it down to 'luck'; many people saw family influences, especially during the preschool years, as the most important factor (e.g. Coleman *et al.*, 1966; Plowden, 1967; West and Farrington, 1973); whereas sociologists were more inclined to see the roots of inequality in the economic and political structure of society itself. Thus, Bowles (1971; see also Bowles & Gintis, 1976) argued that 'educational inequalities are rooted in the basic institutions of our economy . . . (its sources are to be found) in the mutual reinforcement of class subcultures and social class biases in the operation of the school system itself'.

Clearly, there is considerable disagreement about the influence of schooling on children's development. At first sight, too, there appears to be a hopelessly confusing chaos of contradictory research findings. In fact, that is not so. A careful examination of the various studies shows that when like is compared with like the results of different investigations are pretty much in agreement on the main findings. The apparent clashes in evidence arise largely because the studies have

gathered different kinds of data or have used different statistical analyses to answer quite different questions. In order to appreciate just what these differences in approach mean and what the effects of posing the questions in different ways are, it is necessary to briefly review other work before describing our own research.

Large-scale surveys of attainment

It is appropriate to begin with the large-scale cross-sectional surveys which were most influential in creating the impression that education made little difference. Their basic strategy was to gather information on the attainments of very large numbers of children using standardised tests. Variations in children's achievement on these tests were then related to available measures on the children, their homes and their schools. Clearly the results are likely to be influenced by the particular measures used, by the extent to which children or schools actually vary on these measures, and by the methods of statistical analysis employed.

Measures of scholastic attainment

The first point that is immediately striking is that the original American studies used measures of attainment which bore little relationship to anything most schools would aim to teach. Thus, Coleman *et al.* (1966) placed reliance on a single measure of verbal ability. This was necessary because American school children do not take national examinations in school subjects in the way that British children do. However, subsequent research has shown that reliance on a general intellectual measure rather than attainment in subjects specifically taught at school led to an underestimate of the importance of schooling.

The International Educational Achievement (IEA) Survey used specially constructed achievement tests to study school influences on attainment across twenty-two different countries (Postlethwaite, 1975). The findings showed a more substantial school effect than that evident in the Coleman report. However, there is reason to suppose that the construction of standardised tests, which often involves the exclusion of items which show major school differences, is likely to minimise

school effects (Brimer *et al.*, 1977). Certainly, recent studies in Ireland (Madaus *et al.*, 1976) and England (Brimer *et al.*, 1977) of public examination successes have shown greater school effects than those of the IEA survey. Davis (1977) showed that among comprehensive schools (i.e. those taking children of all levels of ability) in one county in England, the proportion of children obtaining 6 or more passes in GCE 'O' level ranged from 6 per cent to 32 per cent. Among grammar schools (taking roughly the 15 per cent most able children) the rates varied from 26 per cent to 78 per cent.

Moreover, the choice of school subject is also liable to influence findings. Thus, the IEA studies (Postlethwaite, 1975; Coleman, 1975), the American *Project Talent* (Shaycoft, 1967) and the British research (Brimer *et al.*, 1977) all indicated that subjects such as mathematics or science which are generally learned mainly at school show greater school differences than do those such as reading which a child may learn in part at home from his parents, or those like English Literature or Social Studies where a child's learning from television or from books at home as well as family conversation are all likely to play a part.

A further point in this connection is that the subjects chosen for the study of school influences should be appropriate to the age group being investigated. Thus, tests of reading are unlikely to show much of a secondary school influence simply because for most children reading skills are largely acquired at primary school level.

School variables

The second major point about the large-scale surveys is that they examined a very narrow range of school variables. The main focus was on resources, as reflected in items like average expenditure per pupil, number of books in the school library and teacher-pupil ratio. It is clear now from many studies in both Britain and the United States that the variations between schools or between local authorities in either financial resources or size of school class show no clear relationships to differences in scholastic attainment (see Jencks *et al.*, 1972; Averch *et al.*, 1972; Rutter and Madge, 1976; Summers and Wolfe, 1977). On the other hand, these rather concrete variables say nothing about a whole range of school features which *might* influence children's

behaviour and attainments. As Jencks *et al.* (1972) themselves pointed out, they 'ignored not only attitudes and values but the internal life of schools'. They were therefore quite unable to consider whether children were influenced by differences in things such as the style or quality of teaching, the types of teacher-child interaction in the classroom, the overall social climate of the school, or its characteristics and qualities as a social organisation. Other studies, which we consider below, suggest that these were grave omissions – inevitable in the context of a massive questionnaire survey but nevertheless liable to lead to rather misleading conclusions. If the effects of schooling are to be judged in terms of the strength of associations between particular school variables and measures of attainment, it is essential that the school variables should be the right ones (meaning that they reflect those aspects of school life which do in fact have an impact). A lack of association may simply mean that an irrelevant variable was chosen.

Gains in attainment

A major problem in all cross-sectional surveys designed to examine school influences is the lack of information on what the children were like when they entered the school. As Coleman (1975) put it: 'the principal villain (in the statistical analyses) is the fact that student populations in different schools differ at the outset. . . . because of this difference, it is not possible merely to judge the quality of a school by the achievements of the students leaving it. It is necessary to control in some way for the variations in student input with which the teachers and staff of the school are confronted. In some way, it is the *increment* in achievement that the school provides which should be the measure of the school's quality'. This can only be determined through longitudinal studies in which repeated measurements are made on the same group of pupils at several different points during their school career. The surveys considered so far all lacked any kind of measure of the children's attainments on entry to school, and so a variety of statistical adjustments had to be made in order to estimate the size of any possible effect. There has been considerable controversy about the best way to do this (see, for example, Mosteller and Moynihan, 1972; Coleman, 1975; Brimer *et al.*, 1977). The statistical details need not concern us here but it is necessary to recognise that different assump-

tions underlie different methods of statistical analysis. Perhaps the most important difficulty is raised by the (common) circumstance of children from disadvantaged homes being more likely to attend disadvantaged schools. If the whole of home influences on development are statistically eliminated *before* determining school effects, school influences will be automatically (and misleadingly) reduced by the extent of overlap between disadvantages at home and at school. There are various ways of handling this problem statistically but none provide a really satisfactory alternative to using measures of attainment on the same children both before and after school entry.

Variations between homes and between schools

Much research in the past two decades has been concerned with attempts to estimate the relative importance of homes and schools in terms of their impact on children's development. The question is very difficult to answer because, statistically speaking, the size or degree of effect of any factor is strongly dependent on the range or extent of variation on that factor or measure.

The point is perhaps best illustrated by an example. One might ask which is more important in determining how fast a car can go – the size of its engine or the skills of its driver? If we studied the issue by looking at the races won by professional drivers, all of whom used cars in the same racing class, we would probably find that the driver made the most difference – simply because the car engines varied so little in size. On the other hand, if the same comparison was made with cars whose engines ranged from, say, 650cc to four litre capacity the answer would be likely to be the other way round. The result would be dependent in part on whether the difference between the 'best' and 'worst' driver was more or less than that between the biggest and smallest engine.

The point is of some relevance when considering the relative importance of homes and schools. All studies which have compared the two have clearly shown that for almost all measures of scholastic attainment, the differences between schools accounted for far less of the variance than did features of the family or home (Rutter and Madge, 1976). The findings are important in showing the limits of what would

be achieved by bringing the 'worst' schools up to the level of the 'best', but too much should not be read into them. The results do not necessarily mean that school influences are of little importance. Instead, they may be a consequence of the fact that there is a bigger difference between the 'best' and 'worst' home than that between the 'best' and 'worst' school. If schools vary in quality less than do homes (as is probably the case) then their statistical 'effect' on children's attainment will also appear less.

Inequalities in attainment or levels of attainment

The last issue with respect to the large-scale survey concerns the questions being examined. The main distinction to bear in mind is that between *inequalities* in attainment and overall *levels* of attainment. Jencks' analyses were primarily concerned with the first issue – namely, if the quality of schooling was greatly improved, what effect would this have in making children more similar to one another (i.e. reducing inequalities in attainment)? The answer was that it would make very little difference. The differences in attainment between children within any one school are much greater than any differences in average attainment between schools. Raising the quality of education does not have the effect of making every one alike. This is because children vary (as a result of both genetic endowment and home experiences) in their ability to profit from educational opportunities. Improving schools will not necessarily make any difference to individual variations.

But it may have a decisive impact in raising overall standards of attainment. The distinction is very nicely brought out by Jack Tizard's (1975) study of the height of London school children. Over the last half-century their average height has risen nine centimetres – a very considerable gain – but of course children still vary enormously in how tall they are. Improved living conditions (probably in terms of better nutrition) have led to major changes in *level*, without any reduction in *inequality*. Similarly, Skodak and Skeels (1949) showed that when children born to seriously disadvantaged mothers were adopted into good homes their average level of intelligence rose greatly, but as with any other group of children, they still differed a lot between themselves.

Conclusions from the large-scale surveys

The large-scale surveys, then, are agreed in showing that differences between schools have rather little to do with the variations between individual children in general cognitive ability. On the other hand, the effects are somewhat greater with respect to subjects such as maths and science which are largely learned at school. Adequate estimates of the size of any school effect, however, are not possible in the absence of information on what the children's behaviour and attainments were like *before* school entry. Insofar as school influences are important, the crucial factor does not appear to consist of the overall level of school resources. Other studies are needed to determine which school characteristics are most likely to foster successful development.

Studies of school variations in attendance, behaviour and delinquency

The studies considered so far all refer to one or other aspect of scholastic attainment. However, other investigations have also shown quite large differences between schools in other aspects of children's performance – in their attendance, behaviour and delinquency rates.

Michael Power and his colleagues (1967) found huge differences in delinquency rates between the twenty secondary schools serving one inner London borough, even after excluding the schools taking the 15 per cent most academic children. Annual average rates varied from 1 per cent in the school with the 'best' record to 19 per cent in the one with the 'worst'. These school differences remained remarkably stable over a six year period and did not appear to be explicable in terms of differences in the catchment area served (Power *et al.*, 1972). The differences applied both to first offenders and to recidivists.

More recently, Dennis Gath and his research team (1977) have produced broadly similar findings for children living in an outer London borough of rather different social characteristics to that studied by Power. Both primary and secondary schools differed widely in probation rates (reflecting delinquency) and in rates of referral to child psychiatric clinics. The two sets of rates showed parallel trends, schools with a high referral rate tending also to have a high delinquency rate. As in the Power study, the school variations could not be

explained in terms of the areas where the children lived.

Neither of these studies had data on the children's characteristics at school entry and neither was able to determine which school features were associated with low or high delinquency rates. Studies by Donald West and David Farrington (1973) and by David Reynolds (Reynolds and Murgatroyd, 1977; Reynolds *et al.*, 1976) make up for one or other of these deficiencies but neither has data to deal with both problems. West and Farrington's work is based on a prospective study of some four hundred boys living in a working class area in inner London. The sample size was rather small for an investigation of this kind and only four secondary schools took as many as forty children each. However, Farrington (1972) was able to show that much of the school variation was explicable in terms of intake differences. The high delinquency schools took a higher proportion of boys already showing troublesome behaviour at primary school. The study strongly emphasises the importance of having longitudinal data in order to look at *changes* in behaviour according to the school attended. The findings have been interpreted as showing that schools do not influence delinquency rates (West and Farrington, 1973). However, examination of the data shows that there were some school variations. Thus, for boys with 'average' behaviour at primary school, 20 per cent became delinquent at low delinquency schools whereas 31 per cent did so at high delinquency schools.

David Reynolds, on the other hand, did not have any information on the children prior to secondary school entry, although there was evidence that the schools he studied had roughly comparable intakes. He found major variations between them in rates of academic attainment, attendance, delinquency and also unemployment four months after school leaving. These school differences remained stable over a six year period from 1966 to 1972. Preliminary findings on school practices (as observed by Reynolds) showed that enforcement of uniforms, a prefect system and a low level of corporal punishment were all significantly correlated with good attendance. The study is important, not only because of the range of 'outcomes' studied but also because it begins to provide pointers to what sort of features may be influential in schools. The suggestion is that the impact lies in characteristics of the schools in the formal and informal rules they have and in their internal organisation rather than anything directly to do with finances or buildings.